Y-Support Weldment Analysis, based on the KHI proposal as of Feb. 5, 1999:

The Y-support weldment is as follows (please, refer to weldment dwg.):

(a) 20 mm weld (was 10 mm):

$h_1 := 20\cdot(0.707)\cdot mm$, effective weld throat

$L_1 := (365 + 950 + 378 + 285 + 100 + 120 + 54 + 24 + 38 + 41)\cdot mm$, weld length

$L_1 = 2.355\cdot 10^3 \circ mm$

$A_{w1} := L_1 \cdot h_1$ $A_{w1} = 3.33\cdot 10^4 \circ mm^2$, effective weld area

(b) 20 mm weld (was 7 mm):

$h_2 := 20\cdot(0.707)\cdot mm$, effective weld throat

$L_2 := 1302\cdot mm$

$A_{w2} := L_2 \cdot h_2$; $A_{w2} = 1.841\cdot 10^4 \circ mm^2$, effective weld area

(c) 5 mm weld:

$h_3 := 5\cdot(0.707)\cdot mm$, effective weld throat

$L_3 := (128 + 200 + 274)\cdot mm$; $L_3 = 602 \circ mm$

$A_{w3} := L_3 \cdot h_3$; $A_{w3} = 2.128\cdot 10^3 \circ mm^2$, effective weld area

The the load on a Y-support weldment, in rounded figure, is about :

$P := 2\cdot 450000\cdot N$ (Refer to Cold Vessel Analysis)

Hence, the shear stress on the weldment is:

$$S_s := \frac{P}{\left(A_{w1} + A_{w2} + A_{w3}\right)} \quad ; \quad MPa := 10^6\, Pa$$ < ----(conversion constant)

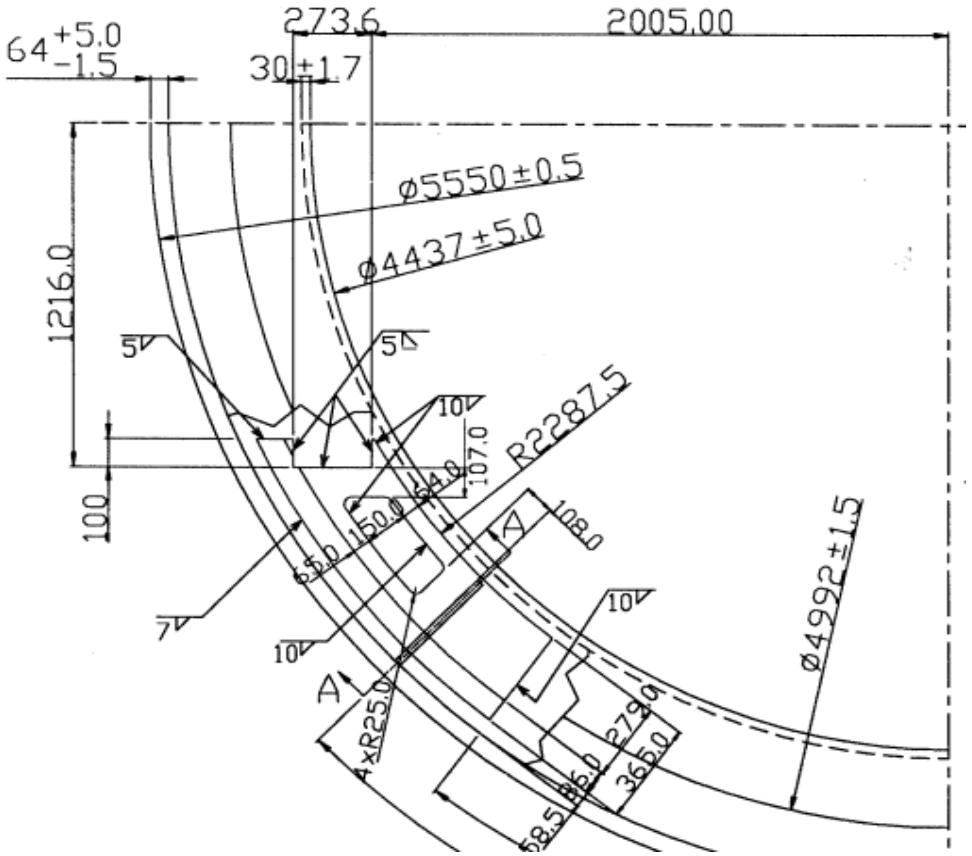
$S_s = 16.717 \circ MPa$

Considering that the fillet weldment has a 45% eff. and the joint has an allowable stress, Pa = 69 MPa, equal to the parent metal (Al5083) as taken from the ASME BPV Code, the approximate factor of safety, FS, is :

$P_a := 69\cdot MPa$

$$FS := \frac{P_a}{\left(\frac{S_s}{0.45}\right)}$$

$FS = 1.857$



DWG. PF - B -008: WELDING OF Y-SUPPORT